

Remarks

Claims 1-6, 8, 9 and 11-19 are pending herein. By this Amendment, claims 7 and 10 have been canceled, claims 4 and 9 have been amended, and new claims 18 and 19 have been added.

Claim 4 has been amended to include the contents of canceled claim 7, and claim 9 has been amended to include the contents of canceled claim 10.

New claims 18 and 19 depend upon claims 3 and 14, respectively, and recite that the exciting coil is disposed at a distance from the fixing member. Support for this recitation can be found in the specification at, e.g., Figures 5 and 21.

In the Office Action, claim 1 is rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,078,780 to Abe et al. (“Abe”); claims 9, 14 and 16 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,605,802 to Nagahira (“Nagahira”); claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Abe in view of U.S. Patent No. 6,037,576 to Okabayashi et al. (“Okabayashi”); and claims 3-6, 11, 15 and 17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nagahira in view of Abe. Claims 7, 8, 10, 12 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In view of the amendments and remarks herein, Applicants respectfully request reconsideration and withdrawal of the rejections and objection set forth in the Office Action.

I. Rejection of Claim 1

Claim 1 is rejected under §102(b) as being anticipated by Abe.

Abe is cited for disclosing an image heating apparatus (Figure 2) comprising a fixing member (10) including a support member (16), a heating layer (1) formed adjacent thereto in a form of a thin film of a non-magnetic, electrically conductive material (see col. 6, lines 6-9), and a magnetic field generating means including an exciting coil (18).

Applicants respectfully submit that Abe does not anticipate instant claim 1.

The fixing apparatus recited in claim 1 includes “a support member formed of a ferromagnetic material”. The non-magnetic, electrically conductive heating layer is formed adjacent to the support member. According to the instant specification:

With the fixing roller 141 having the support member 141a and the heating layer 141b constructed as described above, since the heating layer 141b is a non-magnetic, electrically conductive thin film, the heating layer 141b has a low heat capacity. This makes efficient heating possible. Moreover, with the heating layer 141b disposed adjacent to the support member 141a, a magnetic flux leaking from the magnetic field source is absorbed by the support member 141a. This helps reduce the influence of a leaking magnetic flux on metal parts located around the fixing apparatus 14. (see paragraph [0065])

As noted above, the Office Action states that the image heating apparatus in Abe includes a support member (16). Reference numeral 16 in Abe designates a film guide (see, e.g., col. 4, lines 22-26). Abe teaches that the film guide "is, for example, molded product of liquid crystal polymeric phenol resin or the like" (col. 4, lines 25-26). Abe does not teach or suggest that the film guide may be formed of a ferromagnetic material.

Abe teaches that in the first embodiment of the invention therein (see Figure 2), the fixation film 10 therein has a layer structure composed of a heating layer 1, an elastic layer 2 and a release layer 3 (see, e.g., col. 5, lines 61-66). Elastic layer 2 is composed of a material such as silicone rubber, fluoro-rubber or fluorosilicone rubber (col. 6, lines 33-35). Thus, elastic layer 2 is not formed of a ferromagnetic material. In the second embodiment in Abe (see Figure 5), the heating layer 1 is disposed between elastic layer 2 and a heat insulating layer 4. Heat insulating layer 4 is preferably a heat resistive film, such as fluoro-resin, polyimide resin, polyamide resin, polyamide-imide resin, PEEK resin, PES resin, PPS resin, PFA resin, PTFE resin, or FEP resin. Thus, heat insulating 4 is also not formed of a ferromagnetic material.

As noted above, the support member recited in instant claim 1 is formed of a ferromagnetic material. Abe does not teach or suggest a support member formed of a ferromagnetic material. Therefore, Abe does not teach or suggest the support member recited in claim 1.

Thus, for at least this reason, Applicants submit that Abe does not anticipate claim 1.

II. Rejection of Claims 9, 14 and 16

Claims 9, 14 and 16 are rejected under 102(e) as being anticipated by Nagahira.

Nagahira is cited for disclosing an image heating apparatus (106) comprising a fixing roller (1) including a heating layer (1a) formed of a magnetic metal and heating layer (1b)

formed of a non-magnetic metallic layer (claim 7 and col. 7, lines 60-65); a pressure roller (7) in contact with the fixing roller to form in between a nip (N) through which paper (P) is passed; and a magnetic field generating means (4) disposed outside of the fixing roller (Figure 6). The magnetic field includes a magnetic core (3) disposed near an exciting coil (2). Regarding instant claim 16, Nagahira is cited for showing that the magnetic field generating means is disposed inside the fixing roller near a portion where the fixing roller and the pressure roller make contact with each other. Applicants respectfully submit that Nagahira does not anticipate claims 9, 14 and 16.

A. Claim 9

Claim 9 has been amended to include the contents of canceled claim 10. According to the Office Action, claim 10 is objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Amended claim 9 represents the independent form of claim 10. Thus, Applicants submit that amended claim 9 is allowable.

B. Claims 14 and 19

As noted above, new claim 19 has been added which depends upon claim 14.

In the fixing apparatus of claim 14, the fixing member is provided with a magnetic-metal heating layer and a non-magnetic-metal heating layer. The non-magnetic-metal heating layer is “kept in intimate contact with an outer surface of the magnetic-metal heating layer”. In other words, the magnetic-metal heating layer is the inner layer and the non-magnetic-metal heating layer is the outer layer. The fixing apparatus of claim 14 also includes an exciting coil that is disposed outside the fixing member. Claim 19 recites that the exciting coil is disposed at a distance from the fixing member.

Claim 14 is directed to the tenth embodiment of the fixing apparatus. The specification discusses the advantages of such embodiment as follows:

the magnetic-metal and non-magnetic-metal heating layers 412 and 413 of the fixing roller 411 are made to generate heat simultaneously by the shared exciting coil. This makes it possible to obtain high heating efficiency. (paragraph [0155])

Moreover, the electromagnetic induction section 430 is disposed outside the fixing roller 411. This helps prevent the ferrite core 432 from being adversely affected by the heat generated by the

fixing roller 411. It is also easy to achieve forced cooling by the use of a fan. As a result, it is possible to prevent deterioration of the performance of the ferrite core 432 and thereby obtain high heating efficiency. (paragraph [0156])

In the first, second, third and sixth embodiments of the image heating apparatus in Nagahira, the magnetic metallic layer 1a is the inner layer of the two-layer laminated structure formed on the fixing roller 1, the non-magnetic metallic layer 1b is the outer layer of such structure, and the magnetic field generating means 4 (which includes induction coil 2 and magnetic (excitation) core 3) is disposed on the inner side of the fixing roller 1. See, e.g., Figures 2, 3, 4A, 4B, 5A, 5B, 6, 7, 8A, 8B, and 9.

As noted above, the fixing member in instant claim 14 has the magnetic-metal heating layer as the inner layer thereon and the non-magnetic-metal heating layer as the outer layer thereon, and the exciting coil is disposed outside the fixing member. In the embodiments of the heating apparatus in Nagahira where the magnetic metallic layer 1a is the inner layer of the laminated structure on the fixing roller 1 and the non-magnetic metallic layer 1b is the outer layer of such structure, the magnetic field generating means is disposed on the inner side of the fixing roller 1. In all of the embodiments (specifically the fourth embodiment, the fifth embodiment and alternative in the sixth embodiment) of the Nagahira heating apparatus where the magnetic field generating means 4 is disposed outside of the fixing roller, the magnetic metallic layer 1a is the outer layer of the two-layer laminated structure on the fixing roller and the non-magnetic metallic layer 1b is the inner layer of the laminated structure. None of the embodiments of the Nagahira image heating apparatus has the magnetic metallic layer 1a as the inner layer of the laminated structure on the fixing roller 1, the non-magnetic metallic layer 1b as the outer layer of such structure, and the magnetic field generating means disposed outside of the fixing roller.

Nagahira's claim 7 (which was also cited in the Office Action) is directed to a heat generating rotary member having a magnetic metallic layer and a non-magnetic metallic layer provided on an outer side of the magnetic metallic layer, i.e., the non-magnetic metallic layer is the outer layer and the magnetic metallic layer in the inner layer. Claim 7 does not mention a magnetic field generating means. Applicants submit that the Nagahira specification does not

teach or suggest that in the claim 7 embodiment, a magnetic field generating means would be disposed outside of the fixing roller.

Therefore, for at least the foregoing reasons, Applicants submit that Nagahira does not anticipate instant claims 14 and 19.

As mentioned above, claim 19 recites that the exciting coil in the claim 14 fixing apparatus is disposed at a distance from the fixing member.

In all of the embodiments of the Nagahira heating apparatus where the magnetic field generating means 4 is disposed outside of the fixing roller, the magnetic field generating means 4 is fixed to the fixing roller. For example, the Nagahira specification teaches that in the fourth embodiment of the heating apparatus 106, the magnetic field generating means 4 including the induction coil 2 “is fixed to and disposed on the outer side of the roller which is the magnetic metallic layer 1a side in opposed relationship with the fixing roller 1” [emphasis added] (col. 7, line 66 – col. 8, line 2).

Nagahira does not teach or suggest that in those embodiments of the heating apparatus where the magnetic field generating means 4 is disposed outside of the fixing roller, the magnetic field generating means 4 is disposed at a distance from the fixing roller.

Thus, for at least this additional reason, Applicants submit that Nagahira does not anticipate claim 19.

C. Claim 16

In the fixing apparatus of instant claim 16, the non-magnetic-metal heating layer is “kept in intimate contact with an inner surface of the magnetic-metal heating layer”, i.e., the non-magnetic-metal heating layer is the inner layer and the magnetic-metal heating layer is the outer layer, disposed on the fixing member. In the claim 16 fixing apparatus, the exciting coil is disposed inside the fixing member.

Claim 16 is directed to the eleventh embodiment of the fixing apparatus. The specification discusses the advantages of such embodiment as follows:

the magnetic-metal and non-magnetic-metal heating layers 512 and 513 of the fixing roller 511 are made to generate heat simultaneously by the shared exciting coil 531. This makes it possible to obtain high heating efficiency. Moreover, the magnetic-metal heating layer 512 is disposed outside the non-magnetic-metal heating layer 513 with respect to the exciting coil

531 disposed inside the fixing roller 511. This makes it possible to prevent leakage of a magnetic flux to outside the fixing apparatus 501 and thereby prevent metal parts located around the fixing apparatus 501 from being heated unnecessarily. (paragraph [0174]).

Regarding claim 16, the Office Action cites Figure 2 in Nagahira. Figure 2 represents the first embodiment of the Nagahira image heating apparatus 106 (see, e.g., col. 2, lines 31-33). In this embodiment, although the magnetic field generating means 4 is disposed on the inner side of the fixing roller 1, the magnetic metallic layer 1a is the inner layer of the two-layer laminated structure disposed on the fixing roller 1, and the non-magnetic metallic layer 1b is the outer layer of the laminated structure (see col. 4, lines 1-4). In instant claim 16, as pointed out above, the non-magnetic-metal heating layer is the inner layer and the magnetic-metal heating layer is the outer layer, disposed on the fixing member.

In all of the embodiments in Nagahira where the magnetic metallic layer 1a is the outer layer of the laminated structure disposed on the fixing roller and the non-magnetic metallic layer 1b is the inner layer of such structure, the magnetic field generating means 4 is disposed on the outside of the fixing roller. Reference is made, e.g., to the fourth embodiment, the fifth embodiment and the alternative in the sixth embodiment. Nagahira does not teach or suggest a fixing apparatus like that of claim 16, wherein the non-magnetic-metal heating layer is the inner layer of the laminated structure on the fixing member, the magnetic-metal heating layer is the outer layer of such structure, and the exciting coil is disposed inside the fixing member.

Thus, for at least these reasons, Applicants respectfully submit that Nagahira does not anticipate claim 16.

III. Rejection of Claim 2

Claim 2 is rejected under §103(a) as being unpatentable over Abe in view of Okabayashi.

According to the Office Action, Abe discloses the fixing apparatus of claim 2 except for the presence of a temperature measuring means inside the fixing member. Okabayashi is cited for disclosing an image heating apparatus (see Figure 5) comprising a temperature measuring means located inside the fixing member. The Office Action states that it would have been obvious to provide the image heating apparatus disclosed in Abe with a temperature measuring

means disposed inside the fixing member as taught in Okabayashi “for the purpose of effectively controlling the temperature of the heating layer of the fixing member.”

Claim 2 depends upon claim 1. As discussed above, in the fixing apparatus set forth in claim 1, the support member is formed of a ferromagnetic material. Abe does not teach or suggest a support member formed of a ferromagnetic material. Therefore, Abe does not teach or suggest the fixing apparatus or the support member recited in claim 1.

Applicants submit that modifying the Abe heating apparatus to add the temperature measuring means taught in Okabayashi would not result in the fixing apparatus set forth in instant claim 1.

Thus, for at least this reason, Applicants respectfully submit that claim 2 would not have been obvious over Abe in view of Okabayashi.

IV. Rejection of Claims 3-6, 11, 15 and 17

Claims 3-6, 11, 15 and 17 are rejected under §103(a) as being unpatentable over Nagahira in view of Abe.

According to the Office Action, Nagahira discloses the apparatuses set forth in claims 3-6, 11, 15 and 17 except for the magnetic field generating means having a magnetic core made of high magnet permeability material and the pressure roller including a heating layer formed of a magnetic metal.

Abe is cited for disclosing an image heating apparatus comprising a magnetic field generating means having cores (17, 18) made of high magnetic permeability material (see col. 4, lines 27-34) and a pressure roller (see Fig. 6) including a heating layer formed of a magnetic metal (see col. 8, line 56 to col. 9, line 3).

According to the Office Action, it would have been obvious to provide the image heating apparatus disclosed in Nagahira with a magnetic field generating means having a magnetic core made of high magnetic permeability material and a pressure roller including a heating layer formed of a magnetic metal as taught in Abe “for the purpose of increasing the efficiency of energy consumption of the fixing roller.”

Applicants respectfully submit that claims 3-6, 11, 15 and 17 would not have been obvious over Nagahira in view of Abe.

A. Claims 3 and 18

Claim 3 depends upon claim 1. New claim 18 depends upon claim 3. In the fixing apparatus of claim 3, the heating layer is a non-magnetic, electrically conductive material disposed on an outer circumferential surface of the support member. Thus, the fixing apparatus of claim 3 has a non-magnetic metal layer as the outer layer. Furthermore, in the claim 3 fixing apparatus, the exciting coil is disposed outside the fixing member.

As discussed above, in those embodiments of the Nagahira heating apparatus where the non-magnetic metal layer is the outer layer on the fixing roller, the magnetic field generating means is disposed on the inner side of the fixing roller 1. Nagahira does not teach or suggest an embodiment wherein the non-magnetic metal layer is the outer layer on the fixing roller and the magnetic field generating means is disposed outside of the fixing roller 1. Abe does not cure this deficiency because the excitation coil (18) therein is disposed inside the film guide (16) (see, e.g., col. 4, lines 27-29, and Figure 2).

Therefore, for at least this reason, Applicants respectfully submit that claim 3 would not have been obvious over Nagahira in view of Abe.

New claim 18 recites that the exciting coil is disposed at a distance from the fixing member. Neither Nagahira nor Abe teaches this feature. Nagahira teaches that in those embodiments of the heating apparatus where the magnetic field generating means 4 is disposed outside of the fixing roller, the magnetic field generating means 4 is fixed to the outer surface of the fixing roller.

Thus, for at least this additional reason, Applicants respectfully submit that claim 18 would not have been obvious over Nagahira in view of Abe.

B. Claims 4-6

Claim 4 has been amended to include the contents of canceled claim 7. According to the Office Action, claim 7 is objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Amended claim 4 represents the independent form of claim 7. Thus, Applicants submit that amended claim 4 is allowable. Claims 5 and 6 depend upon claim 4. Therefore, Applicants submit that these claims are also in allowable form.

C. Claim 11

Claim 11 depends upon claim 9. Claim 9 has been amended to include the contents of canceled claim 10, and, for that reason, is in allowable form. Because claim 11 depends upon claim 9, Applicants respectfully submit that claim 11 is also in allowable form.

D. Claim 15

Claim 15 depends upon claim 14. Applicants submit that claim 15 is patentable over Nagahira for the same reason claim 14 is patentable over this reference, i.e., none of the embodiments of the Nagahira image heating apparatus has the magnetic metallic layer 1a as the inner layer of the laminated structure on the fixing roller 1, the non-magnetic metallic layer 1b as the outer layer of such structure, and the magnetic field generating means disposed outside of the fixing roller. Abe does not cure this deficiency because the excitation coil (18) therein is disposed inside the film guide (16) (see, e.g., col. 4, lines 27-29, and Figure 2).

Therefore, for at least this reason, Applicants respectfully submit that claim 15 would not have been obvious over Nagahira in view of Abe.

E. Claim 17

Claim 17 depends upon claim 16. Applicants submit that claim 17 is patentable over Nagahira for the same reason claim 16 is patentable over this reference, i.e., Nagahira does not teach or suggest a fixing apparatus wherein the non-magnetic-metal heating layer is the inner layer of the laminated structure on the fixing member, the magnetic-metal heating layer is the outer layer of such structure, and the exciting coil is disposed inside the fixing member. Even if the Nagahira heating apparatus were modified to include Abe's magnetic field generating means having a magnetic core made of high magnetic permeability material and Abe's pressure roller including a heating layer formed of a magnetic metal, the result would not have been the fixing apparatus recited in instant claim 17.

Therefore, for at least this reason, Applicants respectfully submit that claim 17 would not have been obvious over Nagahira in view of Abe.

V. Allowable Subject Matter

Claims 7, 8, 10, 12 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 7 has been canceled and its contents incorporated into claim 4. Thus, amended claim 4 represents the independent form of claim 7 and, therefore, is in allowable form. Claim 8 depends upon amended claim 4 and, therefore, is also in allowable form.

Claim 10 has been canceled and its contents incorporated into claim 9. Thus, amended claim 9 represents the independent form of claim 10 and, therefore, is in allowable form. Claims 12 and 13 each depend upon amended claim 9 and, therefore, are also in allowable form.

Thus, in view of the amendments to claims 4 and 9, Applicants respectfully submit that claims 4, 8, 9, 12 and 13 are in allowable form.

VI. Conclusion

In view of the amendments and remarks herein, Applicants respectfully request that the rejections and objection set forth in the Office Action be withdrawn and that claims 1-6, 8, 9 and 11-19 be allowed.

If any additional fees are due in connection with the filing of this paper, such as fees under 37 C.F.R. §§1.16 or 1.17, please charge the fees to Deposit Account 02-4300; Order No. 032739.106.

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Dated: August 15, 2006